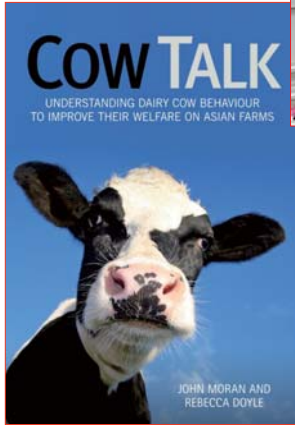


母牛分娩照護機器人

Maternity Calving Care Robot

畜試所 吳明哲組長
Mingche WU
Taiwan Livestock Research Institute



Iowa State University

What is the MOST important - GOAL?



1

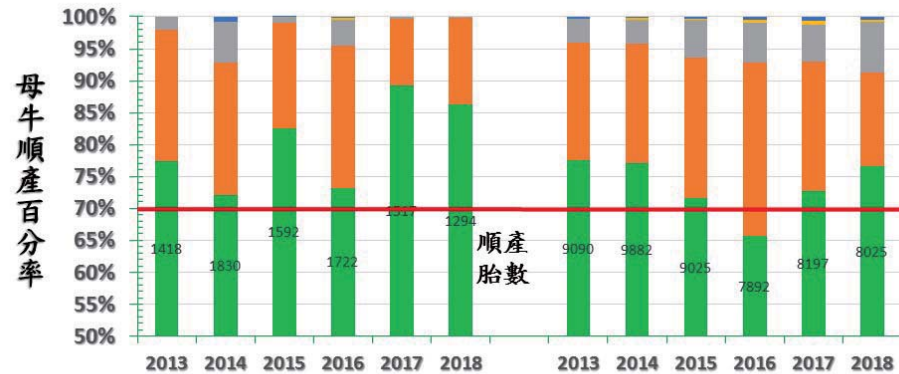
Photographs, Illustrations
256 pages, 245 x 170 mm
Publisher: CSIRO
Publishing
February 2015
ISBN: 9781486301614

~93~

台灣DHI乳牛群母牛分娩難易度

代碼 定義

- 1 易產犢，完全無需協助，自然分娩，順產。
- 2 產犢順，需部分協助(一人)，需輕微協助後順產，屬輕度難產。
- 3 產犢不易，需兩人或以上費力協助後順產(含器械順產)，中至重度協助後才順產，屬中至重度難產。
- 4 剖腹產。
- 5 死產，毀胎術，碎胎術。



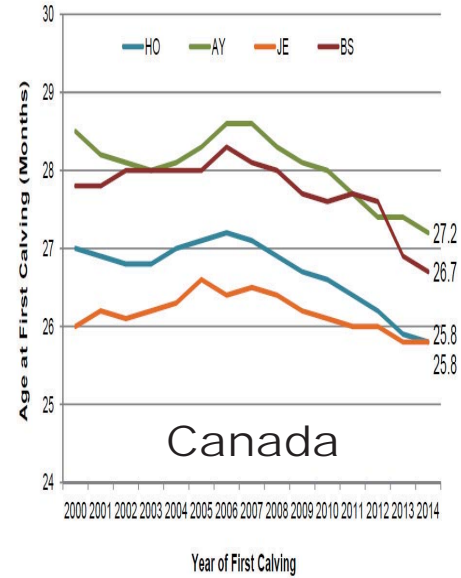
Mingche WU 2018/12/27

種牛畜牧場 Breeding Farm

畜牧場 Production Farm

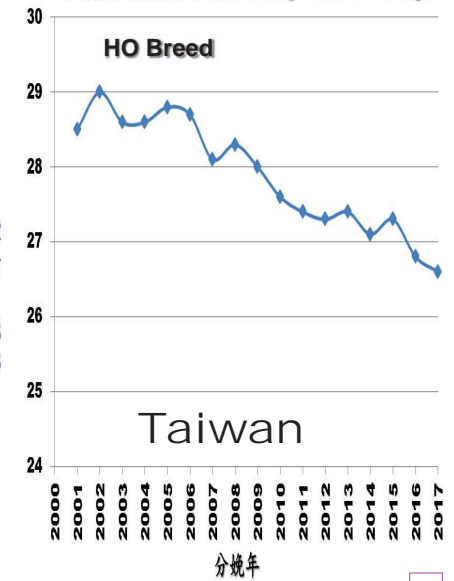
3

Figure 1: Trend in Average Age at First Calving by Breed



Tropical Dairy Cattle

台灣乳牛初產月齡平均(Month age at first calving)



2

母牛分娩照護機器人

台灣DHI乳牛群母牛分娩難易度

代碼 定義

- 1 易產犢，完全無需協助，自然分娩，順產。
- 2 產犢順，需部分協助(一人)，需輕微協助後順產，屬輕度難產。
- 3 產犢不易，需兩人或以上費力協助後順產(含器械順產)，中至重度協助後才順產，屬中至重度難產。
- 4 剖腹產。
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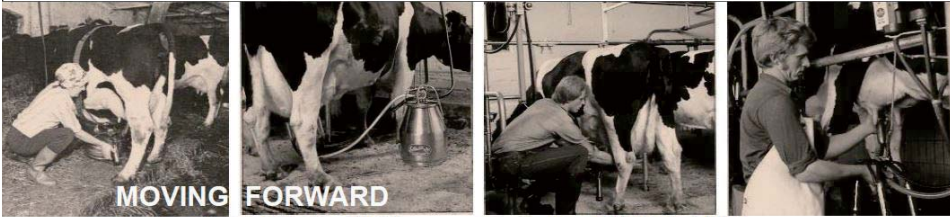


<https://www.independent.ie/business/farming/quick-fix-of-inducing-cows-should-not-be-a-substitute-for-good-management-26711641.html>

Dr Dan Ryan
March 8 2011 5:00 AM

4

Denmark



MOVING FORWARD

- From lifestyle to food production
- From recording to legislation
- From raw milk to infant milk powder
- From human skills to technical understanding



ICAR 2018 Auckland, New Zealand



THE GLOBAL STANDARD FOR LIVESTOCK DATA



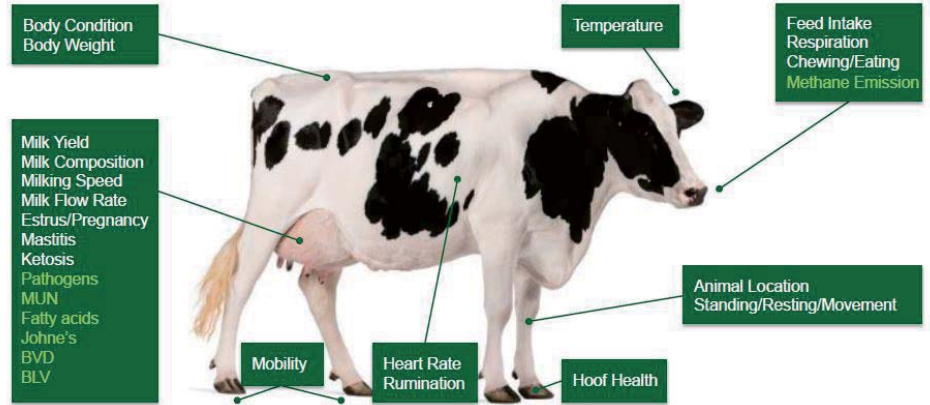
WHERE WE CAME FROM AND WHERE WE ARE HEADING

Milk recording and data value before and now
Uffe Lauritsen RYK, Denmark

5

Denmark

FARMER OR TECHNOLOGY



ICAR 2018 Auckland, New Zealand



THE GLOBAL STANDARD FOR LIVESTOCK DATA



February 11, 2018

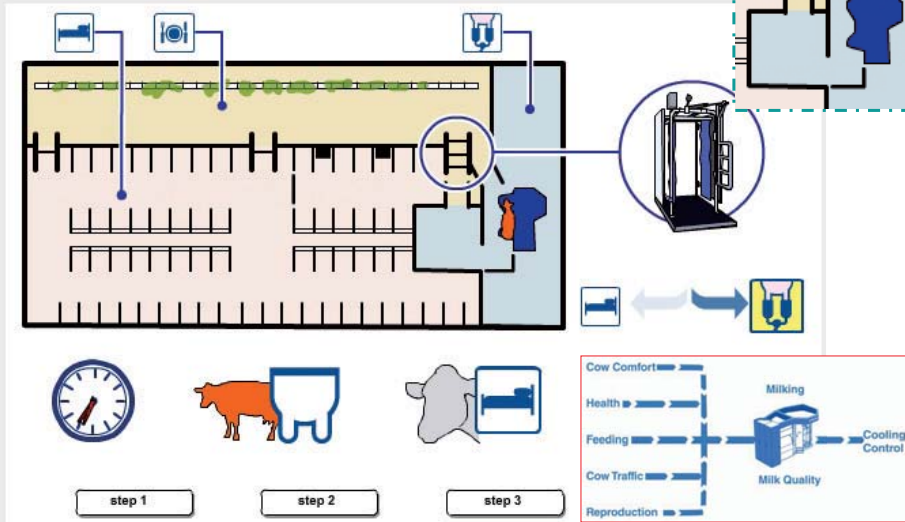
WHERE WE CAME FROM AND WHERE WE ARE HEADING

Milk recording and data value before and now
Uffe Lauritsen RYK, Denmark

6

~94~

櫥櫃型擠乳機器人導入乳牛場 Cow traffic concepts



<http://www.delaval.com/en/-/Product-Information1/Milking/Systems/Automatic/Cow-traffic-concepts/>

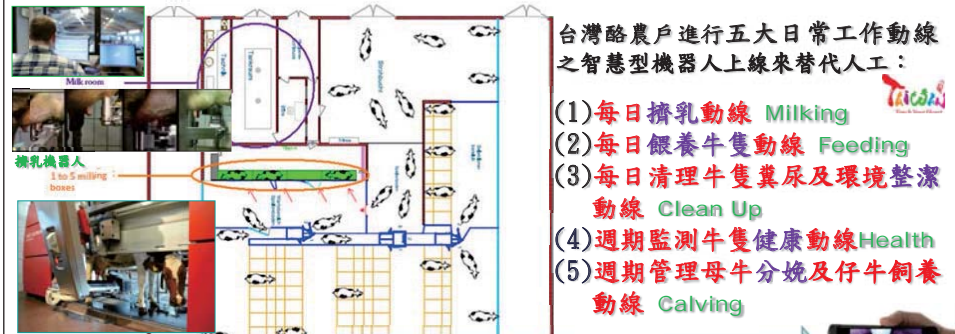
7

智慧農業4.0

生乳產業領航產業技術研發與應用

台灣乳牛場導入五大動線機器人

Robotic Systems for Dairy Cattle Farm in Taiwan



台灣酪農戶進行五大日常工作動線之智慧型機器人上線來替代人工：

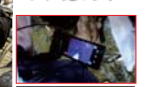
- (1) 每日擠乳動線 Milking
- (2) 每日餵養牛隻動線 Feeding
- (3) 每日清理牛隻糞尿及環境整潔動線 Clean Up
- (4) 週期監測牛隻健康動線 Health
- (5) 週期管理母牛分娩及仔牛飼養動線 Calving

歐美日韓機器人照護乳牛動線
Basic Milking Center Layout

Smart Agriculture 4.0 Program for sustainable dairy farm



乳牛人工授精
目視週期監
測牛隻健康



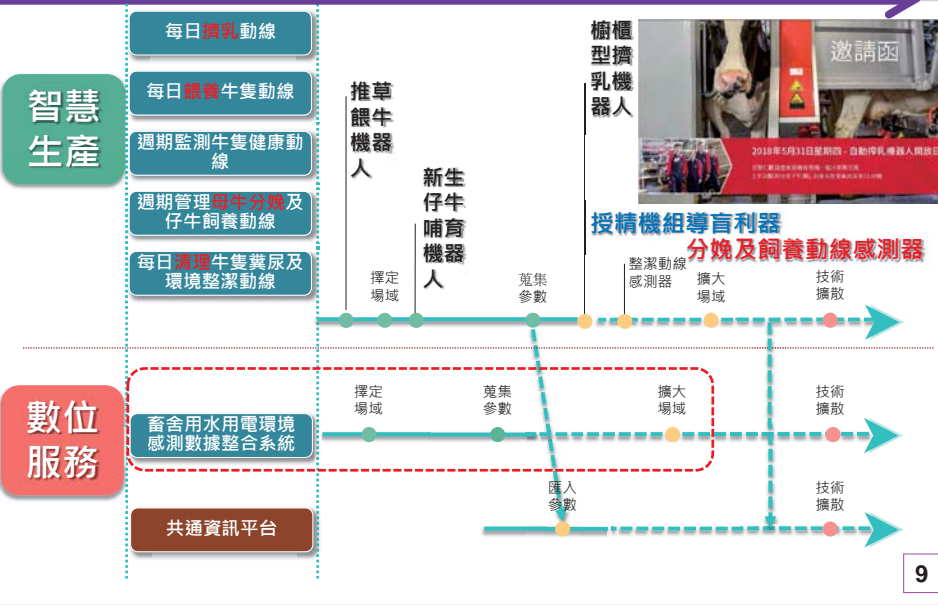
Mingche WU 2018/11/10

<https://www.lely.com/solutions/milking/stronaut-a4/>

8

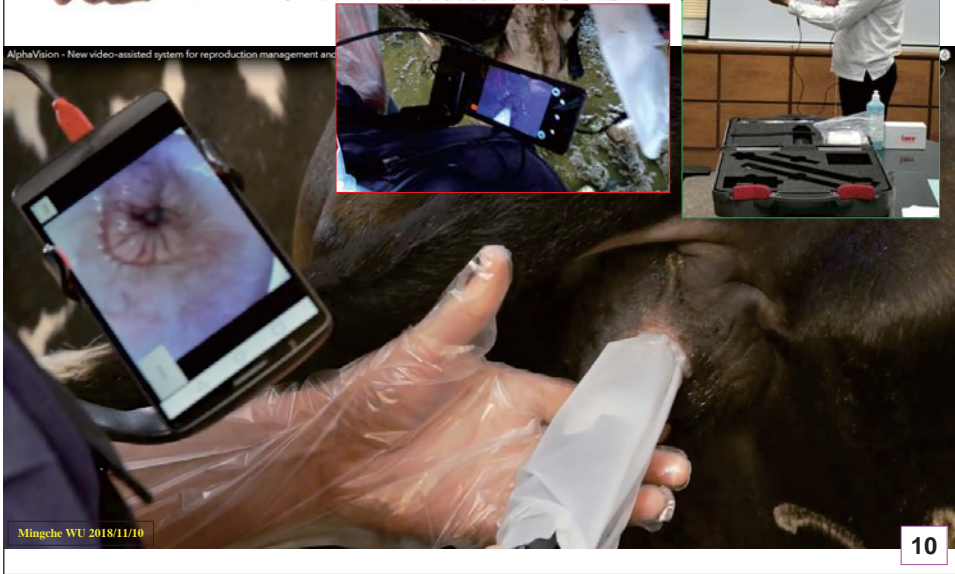
生乳領航產業

Mingche WU 2018/11/10



週期監測牛隻健康動線-- 乳牛人工授精目視鏡儀器

於2018年1月15日由林樹枝種牛場開始應用



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HOARD'S DAIRYMAN

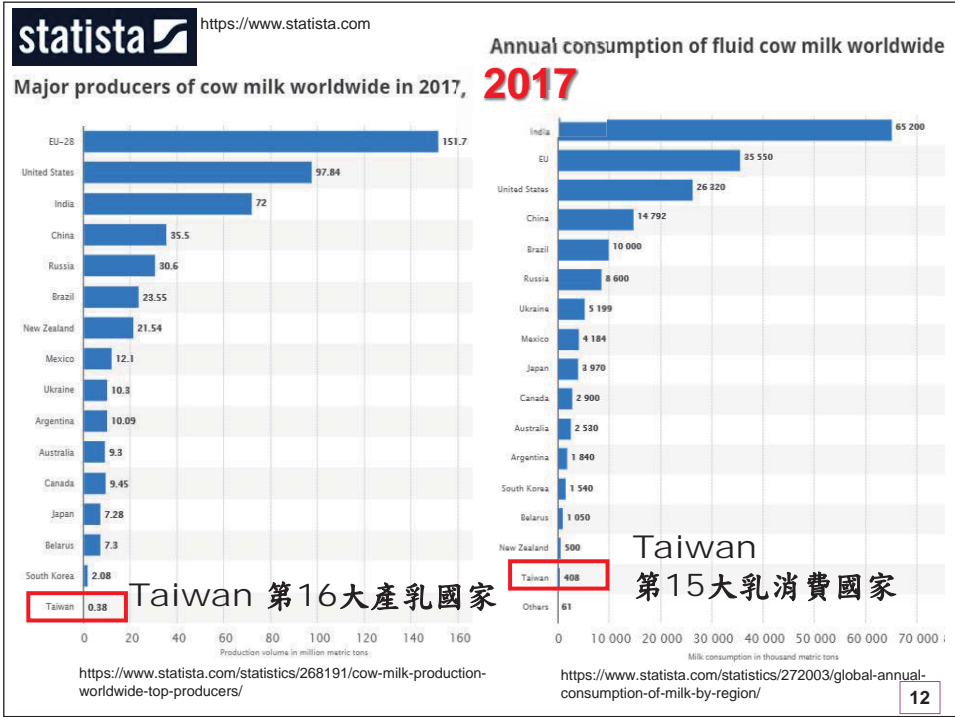
<https://hoards.com/blog-20040-pick-the-calving-scenario-thats-right-for-you.html>

- Calving space**
- ❑ 144 square feet per cow
 - ❑ 120 square feet per cow
- ✓ Feed & Water
 - ✓ Clean & Dry
 - ✓ Comfortable



- Traditional calving
- Just in time calving
- Socially stable calving

According to Iowa State's Jenn Bentley, finding the right maternity system on a farm is all about providing the necessities for the cow while meeting the preferences of the farm. **Maternity care is still an art!**



Taiwan 第16大產乳國家

Taiwan 第15大乳消費國家

<https://www.statista.com/statistics/268191/cow-milk-production-worldwide-top-producers/>

<https://www.statista.com/statistics/272003/global-annual-consumption-of-milk-by-region/>